

Remarks

The Applicants have amended the Specification to place it into better condition for allowance. Also, the Applicants have made several minor changes to clarify the terminology involving vanadium. For example, Paragraph [0007] has been amended to change “(V(VI))” to “(IV)”. The additional “V” that was removed simply was a reference to the elemental symbol for vanadium. Tetravalent vanadium should, of course, be referred to as IV, not VI. To avoid confusion, the above-mentioned change was made. Entry of the changes into the official file are respectfully requested.

The Applicants note the Examiner’s helpful comments with respect to the Abstract. The Abstract has been amended to shorten it.

The Applicants also note the Examiner’s comments concerning the Preliminary Amendment and selected ones of the Tables in the Specification. The Tables replaced the original Tables and merely added an inadvertently omitted “Al” from the heading on the right side of those tables entitled “Coating Weight” in terms of Mn or Mg (mg/m²).

Claims 1-3 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite. Claim 1 has accordingly been amended to recite that the resin A is polymeric. This is similar to Claim 3.

With respect to Claim 3, it has been amended in the same manner as the Specification to clarify the tetravalent vanadium compound issue discussed above with respect to the changes to the Specification. Withdrawal of the §112 rejection is respectfully requested.

Claims 1 and 3 stand rejected under 35 U.S.C. §103 over the combination of Komai with Matsuzaki ‘980. The Applicants enclose the following translations for the Examiner’s convenience: English translation of claims of Komai on page 2, Line 1 to Page 3, Line 12 in Japanese publication; English translation of Specification of Komai on Page 7, Lines 10 to 26 in Japanese publication; and

English translation of Paragraph [0047] of Matsuzaki in Japanese publication and respectfully submit that even if one skilled in the art were to make the hypothetical combination the resulting combination would result in subject matter different from that set forth in those claims. Detailed reasons are set forth below.

The Applicants first note with appreciation the Examiner's frank acknowledgment that Matsuzaki '980 does not disclose tetravalent vanadium in an amount of 0.1~50 mg/m² in terms of V in a first layer coat. The rejection turns to Komai to cure that deficiency. The Applicants respectfully submit, however, that Komai, although it discloses the use of vanadium, would still result in a product different from that set forth in those claims.

A 1st layer film of Matsuzaki is composed of (α) fine particles of an oxide (equivalent to SiO₂), (β) phosphoric acid and/or phosphoric acid compound, and (γ) at least one selected from the group consisting of Mg, Mn and Al.

A film equivalent to the 1st layer according to Komai is composed of an oxide or a hydroxide of tetravalent vanadium and at least one selected from the group consisting of P, Mo, Ti or Zr. P, out of the group, is considered to have been derived from phosphoric acids used as a pH adjusting agent.

On the other hand, a 1st layer film of the Applicants' claims is composed of (α) SiO₂: 1~2000 mg/m², (β) phosphoric group: 1~1000 mg/m², (γ) at least one selected from the group consisting of Mg, Mn and Al: 0.5~800 mg/m² and (δ) tetravalent vanadium compound: 0.1~50 mg/m².

In consideration of the above, Matsuzaki does not disclose the claimed tetravalent vanadium. In sharp contrast, Komai does not disclose SiO₂ as claimed. Also, at least one selected from the group consisting of Mg, Mn and Al is not disclosed. Further, Komai imposes a constituent

requirement of at least one selected from the group consisting of Mo, Ti and Zr, which are completely dissimilar to the metal of Matsuzaki.

In other words, the metal which Komai uses is tetravalent or hexavalent metal while the metal of Matsuzaki is of divalent, trivalent or heptavalent. Thus, Komai and Matsuzaki use metals of quite different nature. Because Komai exemplifies oxides as metal compounds (cf. Page 7, Lines 15 to 16), when these metals are indicated as typical oxides, TiO_2 (IV), ZrO_2 (IV) and MoO_3 (VI) of Komai fall under MgO (II), Al_2O_3 (III) and Mn_2O_7 (VII) of Matsuzaki can be shown.

That is, the 1st film of Komai and the 1st film of Matsuzaki are metals of different valence and this means they are completely different in structure.

The 1st film of Komai, wherein Mo, Ti or Zr can be regarded to be the equivalent of P from its Claim 8, is a film of a V – (P, Mo, Ti, Zr) system.

Komai set out the mechanism of forming the 1st film on Page 7, Lines 18 to 23 in the Japanese Specification, by mentioning, “When the above-mentioned V in a state of tetravalent is added to a surface treatment solution, at the time when a steel sheet comes into contact or when a steel sheet is subjected to electrolytic treatment, the pH increases which is adjacent to the steel sheet surface in the surface treatment solution and there is formed hydrous oxide in a state of fine sol and, moreover, when a P compound or a water-soluble compound of Mo, Ti or Zr is further added, these compounds are taken in the V sol in a behavior of film formation similar to a case of V and thereby hardly soluble gel film, having excellent corrosion resistance, is formed.”

Therefore, according to Komai, ‘hydrous oxide in a state of fine sol’ which is a basis of the 1st film, is generated with a requirement of “increase of pH” which is brought about by electrolytic treatment with surface treatment solution, which includes tetravalent V, or a reaction between the surface treatment solution and a steel sheet. Furthermore, if “a P compound or a water-soluble

compound of Mo, Ti or Zr" coexists besides V at the time when the hydrous oxide is formed, these compounds are taken in by "the behavior of film formation similar to a case of V", that is to say, "increase of pH" and thereby a hardly soluble gel film (namely, 1st film) is formed. Accordingly, to obtain the 1st film of Komai, a pH increase is an indispensable condition but operations such as drying and baking are unnecessary.

In contrast, Matsuzaki discloses, "each of the above-mentioned elements (namely, Mg, Mn and Al), which is a component (γ), together with phosphoric acid, a phosphate compound and oxide of fine particles (namely, equivalent to SiO_2) is formed into a complex compound in a film and forms a fine barrier film thereby contributing to the improvement of corrosion resistance" (cf. [0047]). From this, a film of Matsuzaki can be said as a film of P – (Mg, Mn, Al) – SiO_2 system. In this way, Komai and Matsuzaki are quite different in terms of film structures.

Moreover, Matsuzaki's method of forming a film comprises, as shown in the examples, simply drying after coating a treatment solution which includes a film component but, increase in pH, which is brought about during film formation by electrolytic treatment or reaction between the treatment solution and a steel sheet, is not necessary.

Matsuzaki and the claimed subject matter are intended for obtaining a film through coating of treatment solution and drying the same. An increase in pH, as in Komai, when forming a film by electrolysis and so forth, is not indispensable. For this reason, one skilled in the art considers that a film of Komai cannot be formed also by the processes of mixing Komai's V, which becomes hardly soluble gel by "increase in pH", with the 1st film component of Matsuzaki, and coating on a steel sheet and drying the same. In addition to this, because metal (Mg, Mn and A1) of Matsuzaki or the claimed subject matter is different from metal (Mo, Ti and Zr) of Komai regarding valence, it is common knowledge to one skilled in the art to consider that a film is not formed with tetravalent V

of Komai. If it is considered to be possible to simply combine Komai and Matsuzaki. As the rejection states, one skilled in the art would be expected to select “at least one selected from the group consisting of Mg, Mn, Al, Mo, Ti and Zr”. Namely, one skilled in the art would not be provided with motivation to combine Komai and Matsuzaki.

The Applicants secured a film which achieved long-term corrosion resistance extended over a longer period of time than ever by using metals of different valence and devising a mixing ratio with tetravalent vanadium and P.

The Applicants invite the Examiner’s attention to Tables 8-1 and 8-2 and the evaluation tabulated in Tables 10-1 and 10-2. These tables are selected because their 2nd layer films are identical and thereby evaluation of the effects of the 1st films can be easily performed.

In most cases, the area ratio of generated white rust is less than 5% even in SST for 140 hours. On the other hand, because tetravalent vanadium is not present in Example 1, it is equivalent to Matsuzaki. However, its area ratio of generated white rust is as high as 25% or more in SST for 140 hours. Even the most favorable evaluation according to Komai through SST at a flat portion is merely evaluation of generated rust after no more than 24 hours (cf. [Evaluation of corrosion resistance], Page 13, Komai) and the evaluation of corrosion resistance in an order of magnitude is on an incomparable level.

From the foregoing, it is understood that the effect of the claimed subject matter is specifically superior to an extent wherein the effect is unachievable merely from a combination of Komai and Matsuzaki. This is because the structure of the 1st film is dissimilar to those of the two references and the effects can be manifested as a synergistic effect of each component which is brought about as the result of organic combination of each component of the claimed subject matter (cf. Page 16, Lines 8 to 14 of the Specification). Thus, the Applicants respectfully submit that the

subject matter of Claims 1 and 3 is anything but obvious. Withdrawal of the rejection is respectfully requested.

Claim 2 stands rejected under 35 U.S.C. §103 over the further hypothetical combination of Matsuzaki '979 with Komai and Matsuzaki '980. The Applicants respectfully submit that further hypothetically combining Matsuzaki '979 with the other two references fails to cure the deficiency set forth above with respect to the hypothetical combination of Komai with Matsuzaki '980. The fact that Matsuzaki '979 may disclose the claimed resin of Claim 2, does nothing to change the teachings of Komai. Withdrawal of the rejection of Claim 2 is also respectfully requested.

In light of the foregoing, the Applicants respectfully submit that the entire Application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,



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